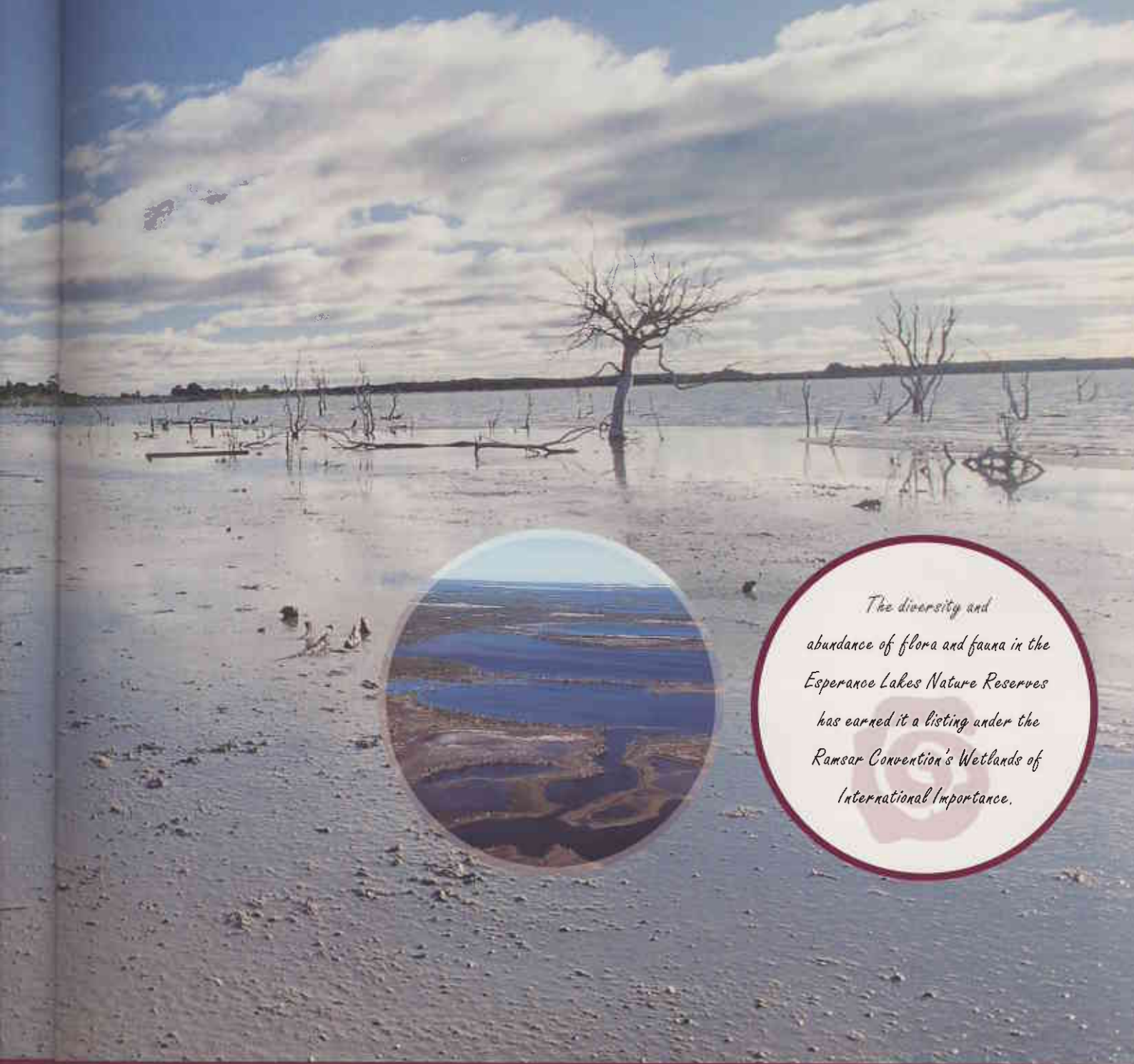


Picture the lakes

by Margaret Kierath and Klaus Tiedemann



The diversity and abundance of flora and fauna in the Esperance Lakes Nature Reserves has earned it a listing under the Ramsar Convention's Wetlands of International Importance.

As the Coolgardie-Esperance Highway descends the Six Mile Hill escarpment on the approach to the coast, visitors are immediately entranced. The vision of a stunning blue ocean and pristine white sands, skirted by luminous lakes and fertile farmland is irresistible.

Ahead lies the Southern Ocean, the islands of the Recherche Archipelago Nature Reserve and Esperance Bay, named after one of the ships commanded by Admiral d'Entrecasteaux, who sailed along the south coast of Western Australia in 1792 and landed at Esperance. The low-lying vegetation gives a clear view of the horizon and the coastline, which is fringed with sand dunes and fronted by river floodplains.

To the west is Pink Lake, while to the east lies a series of wetlands including Lake Warden, Woody, Wheatfield and Mullet Lakes. To the north, just out of sight, is Shark Lake.

It is these lakes and their surrounds, or in the case of Pink Lake, the strip of land along its west side, that comprise the Esperance Lakes Nature Reserves—a total of 3,383 hectares of wetlands. This important conservation area, managed by the Department of Conservation and



Land Management (CALM), plays host to thousands of waterbirds.

GEOLOGICAL HISTORY

The entire Esperance region sits on a rugged basement of granite and metamorphic rock formed during the

Previous page

Main: A narrow, discontinuous line of paperbarks (*Melaleuca cuticularis*) fringe the foreshore of Lake Warden.

Photo – Steve Sadler

Inset: Lake Warden wetlands.

Photo – Stuart Halse/CALM

Above right: The rare hooded plover breeds on the eastern foreshore of Lake Warden during May.

Photo – Hans & Judy Beste/Lochman Transparencies

Below: Picturesque Windabout Lake often used for passive recreation.

Photo – Steve Sadler



Proterozoic period. Projections of this bedrock are still visible as hills and islands. Depressions were filled by sediments during periods of sea-level change during the Tertiary and later Quaternary periods. The sea level in this area was some 275 metres higher than it is now; at that time the sea covered the region—a consequence of the rifting process that saw Australia and Antarctica break apart into separate continents. During this period, sediments of sandstone, siltstone, lignite and spongolite were laid down to form the flat plains of which the Esperance Lakes Nature Reserves are a part. Further geological activity and climate change lowered the sea to its present level in the Pleistocene period and resulted in the sand dunes, coastland, river floodplains and terrace ecosystems of the reserves today.





VEGETATION AND FLORA

Periods of geological activity, changes in climate and later frequent fires have resulted in two land systems in the Esperance area, each with its own distinctive vegetation.

The coastal dunes are characterised by low scrub of *Scaevola crassifolia*, a variety of fan flower, with scattered ridge-fruited mallee (*Eucalyptus angulosa*) reaching above an understorey of needle-leaved broombush (*Melaleuca pentagonia*). Immediately behind the dunes are dense thickets of melaleuca, acacia and banksia species. Inland of the dunes is a scrub heath of showy banksia (*Banksia speciosa*) and scale-leaf honey myrtle (*Melaleuca thymoides*).

Surrounding the lakes are swamp areas with vegetation that provides changing patterns from the fringes, through to the edges of the lakes themselves. Hypersaline Lake Warden contains a belt of samphire and sparse clumps of *Chenopodium glaucum*, a variety of goosefoot, forming a low, succulent scrubland. Shark Lake, with its fresh water, has dense beds of *Baumea articulata* and *Juncus* sp. varieties of rush, and *Schoenus brevifolius* and *Isolepis nodosa*, members of the sedge family.

While no threatened flora species has yet been identified within the reserves, there is a population of the small mat plant (*Wilsonia rotundifolia*). This species has survived the elements of climatic and geological change and for this reason is of particular interest to botanists and conservationists.

Within the lakes there are thriving populations of aquatic flora, all the more remarkable because they survive under extreme conditions such as changing salinity, submersion and desiccation. Essentially they are diatoms, microscopic unicellular algae, and cyanobacteria. These organisms reach peaks of diversity in winter, when the area receives most of its rainfall. Below the lakes' still surfaces there is



a busy industry of microscopic primary producers. These require a mere three to four months to complete their life cycles, when they become food for invertebrates that, in turn, become food for the waterbirds.

Pink Lake, which has much higher salt levels than the other lakes, has fewer diatoms, thereby allowing the rubbery, cohesive mats of cyanobacteria to flourish. The algae *Dunaliella salina*, a cyanobacterium, absorbs the red hydrocarbons found in many plants and gives the lake its distinctive pink colour, a sight even more remarkable on an overcast day.

FAUNA

Side by side with the microscopic aquatic flora live numerous species of aquatic fauna. The protozoa manage to

Top left: When suitable conditions prevail the algae *Dunaliella salina* gives Pink Lake its distinctive colour.
Photo – Klaus Tiedemann/CALM

Top: Showy banksia (*Banksia speciosa*) is the most recognisable banksia found in the Esperance Lakes Nature Reserve.
Photo – Bill Belson/Lochman Transparencies

Above: Shark Lake—the freshest and deepest of the lakes and an important summer refuge for waterfowl.
Photo – Steve Sadler

thrive in the highly saline environment by ingesting bacteria, while the crustaceans found there have evolved to produce eggs that can withstand desiccation. Of the insects that have been identified in the waters of the reserves, two are species of midges or mosquitoes and two are beetles.



THE RAMSAR CONVENTION

The Ramsar Convention is an intergovernmental treaty that provides the framework for international cooperation for the conservation of wetland habitats. It was agreed to in 1971 in the small Iranian town of Ramsar. The Lake Warden System is one of nine wetland areas in Western Australia recognised as Wetlands of International Importance under this convention. The Lake Warden System comprises Lake Warden, Woody Lake and a portion of Mullet Lake Nature Reserves. Shark Lake, Pink Lake and the remainder of Mullet Lake Nature Reserves are not part of the Ramsar wetland system.

The Lake Warden System provides important habitat and regular support for 2,000 waterbirds. An appreciable number of one or more of the visiting species or subspecies are rare, vulnerable or endangered. It is these features that ensured the listing of the area under the Convention.

CALM has special obligations under the Ramsar Convention based on the wise-use concept, defined as 'the sustainable utilisation of wetlands for the benefit of humankind in a way compatible with the maintenance of the natural properties of the ecosystem'.



Bandy Creek, one of the catchments for the reserves, is home to around seven species of fish, one of which is the trout minnow, considered to be WA's rarest species of native minnow.

Esperance Lakes Nature Reserves are home to 59 species of waterbirds, including one threatened species, at least eight species of native mammal, some 31 species of reptile and six species of amphibians.

To see the numbers of banded stilts, Australian shelducks, black swans, chestnut teals, musk ducks and Australasian shovelers is to keenly appreciate why the wetlands are some of the most significant in the south of Western Australia. The Lake Warden system has been listed as a Wetland of International Importance under the Ramsar Convention, an indication of its significant value as a waterbird habitat.

The total Australian population of the hooded plover (*Thinornis rubricollis*), an uncommon species restricted to southern Australia, is only about 5,000 and 10 per cent of these are found in these reserves. Even the threatened Recherche Cape Barren goose can't resist a stopover in these abundant wetlands. Of the many species of birds visiting throughout the year, only nine actually breed in the reserves. They include plovers, ducks, herons, grebes, swamp hens, reed-warblers and crakes, with cormorants known to breed around Wheatfield Lake.

At least 40 species of waterbird are known to visit the fresh waters of Shark Lake in the dry summer, the period of potential drought.

In addition to the various species of kangaroo, possum, bat, gecko, lizard, snake, frog and fish found in abundance in the Esperance area, there are also four introduced species whose presence poses the greatest danger to native animals. Of these, the European fox is the most lethal.

Above left: Cape Barren goose—these birds are regular visitors to the lakes during the drier months from January to May.

Photo – Hans & Judy Beste/Lochman Transparencies

Left: The Lake Warden system can support more than 10,000 swans.

Photo – Steve Sadler

CALM has embarked on a comprehensive program to combat this problem State-wide through the *Western Shield* wildlife conservation initiative (see 'Western Shield' *LANDSCOPE*, Winter 1996). Control of these introduced predators is a management priority.

ABORIGINAL HISTORY

The lakes and Bandy Creek have traditionally been important areas for Aboriginal people because of the easy availability of food and shelter. Their long association with the region was recognised through the registration of three ethnographical sites—relating to water sites and one archaeological site—with the Aboriginal Affairs Department. While these sites lie outside the reserves, they tell of the importance of the area's water resources to Aboriginal culture and heritage.

It is widely known that Aboriginal people carried out frequent burning to flush out game and promote regrowth in vegetation. Such burning was carefully managed and successive burning of patches of land prevented large outbreaks of uncontrollable fires. This cycle of burning and regrowth was a most effective means of preserving and encouraging a healthy ecosystem, and was probably a major factor in the health and condition of the ecosystems of the Esperance Lakes Nature Reserves.

EARLY EUROPEAN HISTORY

Esperance Bay takes its name from the French ship *Espérance*, which took shelter there in December, 1792. But it was not until 1893 that the town was named. During d'Entrecasteaux's visit, landing parties discovered Spencer Lake (Pink Lake) and Lake Warden. Neither of the lakes at the time appeared to hold useful living things, and Bandy Creek was considered totally inadequate for replenishing the ship's water supplies.

The lakes played an important



part in the history and development of Esperance. The original European settlers in the area, the Dempster brothers, ran sheep in the 1860s. The remains of their woolshed are in the Woody Lake Nature Reserve. The site is listed in the Esperance Shire Council Municipal Inventory of Heritage Places.

A section of the East-West Telegraph Line, constructed in 1876, ran through the wetlands in a line now marked by Fisheries and Merivale Roads. In 1929 it was rerouted inland directly from

Balladonia to Perth. The completion of the Coolgardie to Esperance railway line in 1927 saw it passing between Pink Lake and Lake Warden.

Woody Lake and Mullet Lake Nature Reserves were once game reserves where licenced shooters took selected species of waterbirds during declared open seasons. The last such season occurred in 1989–90, after which the reserves were listed as Ramsar Wetlands and legislative changes were made to ban duck-shooting.



Above right: Quenda (southern brown bandicoot), are commonly found within surrounding wetland vegetation.

Photo – Jiri Lochman

Right: Australian shelduck is consistently recorded in great numbers on Lake Warden in spring-summer.

Photo – Steve Sadler



PARTNERS WITH PURPOSE

Community involvement in monitoring and supporting the reserves is vital to its continuing health, particularly as its strongest threats are water-logging, salinity and excess run-off.

Long term survival depends on planning for the future, changing practices and protecting existing remnant vegetation. A feature of the Western Australian Government's Salinity Action Plan is the Wetlands and Natural Diversity Recovery Program. The Lake Warden wetland system has been identified as a high priority area under this program. Complementary work includes fencing off and protecting remnant and riparian vegetation on private property and along watercourses in the catchment of streams that run into the lakes.

A vital partnership exists between community groups—the Esperance Land Conservation District Committee, the five sub catchment groups, the Lake Warden Wetland Community Group, the Esperance Bird Observers Group and landowners—and government agencies such as Agriculture WA, Waters and Rivers Commission, Department of Environmental Protection, Ministry for Planning, the Esperance Shire and CALM.

Support also comes from Esperance Senior High School, whose students are involved in 'Ribbons of Blue,' a water quality monitoring program that provides important data to assist in long-term planning.

VISITING THE RESERVES

In addition to the waterbirds, the reserves attract large numbers of people who come to appreciate the birds, study the wildflowers, enjoy the walk trails or simply to marvel at the scenery. These pleasures are best appreciated by visiting Pink Lake, Lake Warden, Wheatfield and Woody Lakes. Plans are in place to provide bird hides for those who want a closer, unobtrusive window on the habits and characteristics of the birds. Displays giving detailed information on wildlife and habitats are also to be installed. Spring is the season when the lakes are at their most seductive; birds are gliding in and out, the grasses and trees have their new, green growth, and the weather is warm with just a suggestion of chill in the air.

For those who enjoy walking, the reserves offer several walk trails for people of all ages and fitness levels. Access for people with disabilities has been proposed in the draft management plan for the reserves.

An area of Lake Windabout, that is managed by the Esperance Shire Council and has basic visitor facilities that will complement the proposed development of a carpark area and circuit walk around Wheatfield and Woody Lakes.

Water activities such as canoeing, windsurfing and sailing currently take place in some parts of the lakes under carefully managed regulations.

The priority of management is to minimise the impact of visitor recreation use on the natural environment. As a result, some recreation uses are dependent on factors such as water depth and bird breeding.

As you turn for home, refreshed by the memory of the sun rising over the clearest of blue oceans, and lighting up a landscape of awesome contrasts, you know you'll be back.

Above left: Mullet Lake Nature Reserve is an important breeding and feeding site for international migratory bird species.

Below: Aerial view of Woody Lake Nature Reserve, with Frenchman Peak in Cape Le Grand National Park in the distant background.

Photos – Steve Sadler

Margaret Kierath is a free lance writer with an interest in the environment.

Klaus Tiedemann is the District Manager with CALM's Esperance District. He can be contacted on (08) 9071 3733 or email klaust@calm.wa.gov.au.

The authors wish to thank the members of the Esperance Lakes Management Planning Team—Matt Cavana, Coordinator, phone (08) 9334 0563 or email mattc@calm.wa.gov.au; Ian Herford, CALM Regional Planning Officer, phone (08) 9842 4517 or email ianh@calm.wa.gov.au; Stuart Halse, CALM Principal Research Scientist, phone (08) 9405 5136 or email stuarth@calm.wa.gov.au; Bernie Haberley, CALM District Wildlife Officer, phone (08) 9334 0563 or email 417esp@GEI.net.au. Klaus Tiedemann was also a member of the team.



LANDSCOPE

VOLUME FOURTEEN NUMBER 1, SPRING 1998



Can WA's sharefarming plantations also help fight greenhouse gases? See 'Farming Carbon' on page 17.



With increased numbers of travellers, the Canning Stock Route is in need of some TLC. See 'A Track Winding Back' on page 10.



The job of a CALM Wildlife Officer is as much about dealing with people as it is about protecting our native wildlife. See 'On the Wild Side' on page 23.



The Esperance Lakes Nature Reserves are a haven for water birds and a significant international wetland. See 'Picture the Lakes' on page 36.



There are billions of tiny white shells lining the 150-km Shell Beach in Shark Bay. But why are there so many concentrated here? Find out more on page 49.

FEATURES

A TRACK WINDING BACK MANDY CLEWS.....	10
FARMING CARBON SYD SHEA.....	17
ON THE WILD SIDE DAVID MELL.....	23
BOUNCING BACK KEITH MORRIS, ROGER ARMSTRONG, PETER ORELL AND MITZI VANCE.....	28
PICTURE THE LAKES MARGARET KIERATH AND KLAUS TIEDEMANN.....	36
PEOPLE PROTECTING PLANTS ANDREW BROWN.....	43
UNEARTHING THE SECRETS OF SHELL BEACH PADDY BERRY & PHILLIP PLAYFORD.....	49

REGULARS

BUSH TELEGRAPH	4
ENDANGERED ALBATROSSES.....	53
URBAN ANTICS CHESS KNIGHTS IN ARMOUR.....	54

COVER

Two years into the Western Shield program and already three Western Australian native species have been brought back from the edge of extinction, and others are growing in abundance. 'Bouncing Back', on page 28, looks at the successes of the first two years and at where we hope to be at the turn of the century.

Illustration
by Philippa Nikulitsku



Executive Editor: Ron Kawallak
Managing Editor: Ray Bailey
Editor: David Gough
Story Editors: Mandy Clews, Verna Costello, David Gough, Nigel Higgs, Mitzi Vance, Penny Walsh
Scientific/technical advice: Andrew Burbidge, Ian Abbott, Paul Jones and staff of CALM's Science and Information Division
Design and production: Tiffany Aberin, Maria Duthie, Sue Marais
Illustration: Ian Dickinson, Gooitzen van der Meer
Marketing: Estelle de San Miguel ☎ (08) 9334 0296 Fax: (08) 9334 0498
Subscription enquiries: ☎ (08) 9334 0481 or (08) 9334 0437
 Colour Separation by Colourbox Digital
 Printed in Western Australia by Lamb Print
 © ISSN 0815-4465. All material copyright. No part of the contents of the publication may be reproduced without consent of the publishers.
 Visit LANDSCOPE online on our award-winning Internet site NatureBase at <http://www.calm.wa.gov.au/>



Published by Dr S Shea, Executive Director
 Department of Conservation and Land Management,
 50 Hayman Road, Como, Western Australia